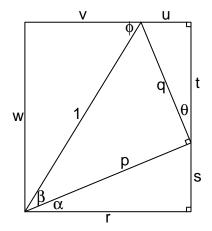
In terms of  $\alpha$  and  $\beta$ , express all the lengths and other angle measures ( $\theta$  and  $\phi$ ).



Variable	Algebraic expression
p =	
q =	
r =	
s =	
$\theta =$	
t =	
u =	
$\phi =$	
v =	
w =	

The angle-sum and angle-difference identities are listed below:

$$\sin(\alpha \pm \beta) = \sin(\alpha)\cos(\beta) \pm \cos(\alpha)\sin(\beta)$$

$$\cos(\alpha \pm \beta) = \cos(\alpha)\cos(\beta) \mp \sin(\alpha)\sin(\beta)$$

You know the following:

$$\sin(225^\circ) = \frac{-\sqrt{2}}{2}$$
  $\sin(60^\circ) = \frac{\sqrt{3}}{2}$ 

$$\cos(225^{\circ}) = \frac{-\sqrt{2}}{2}$$
  $\cos(60^{\circ}) = \frac{1}{2}$ 

Determine  $\cos(285^{\circ})$  exactly.

Prove the (sine) double-angle identity:  $\sin(2x) = 2\sin(x)\cos(x)$ 

(Hint: start with an angle-sum formula from Question 2.)

## Question 4

Prove the (cosine) double-angle identity:  $cos(2x) = 2cos^2(x) - 1$ 

(Hint: start with an angle-sum formula from Question 2. Also, you will need to use the Pythagorean Identity:  $\sin^2(x) + \cos^2(x) = 1$ )

Prove the (cosine) half-angle identity:  $\cos\left(\frac{y}{2}\right) = \pm\sqrt{\frac{1+\cos(y)}{2}}$ .

 $({\it Hint: start \ with \ the \ double-angle \ identity \ from \ \it Question \ 4.})$ 

## Question 6

Given  $\cos(166^\circ) \approx -0.97$ , what is  $\cos(83^\circ)$ ? Please set up an expression, but do **not** try to simplify or evaluate a decimal approximation.

(Hint: 166/2 = 83.)